The World Beneath Our Feet: Bugs and the Barataria Preserve

Grades 1 through 3

Courses: Science, English & Language Arts

Lesson Plan Focus:

The world beneath our feet is teeming with life and activity. Invertebrates of every shape and size are busy pollinating plants and crops, disposing of rotting organic materials, and providing food for animals higher up on the food chain. Explore this tiny world bursting with creatures through art, reading, hands-on science, and discovery projects.

A note to teachers:

Thank you for your interest in having your students participate in the "World Beneath Your Feet" program at the Barataria Preserve. All of our programs at the Barataria Preserve are free and all supplies for the on-site activities are provided by the National Park Service.

The rest of the document includes all of the background material and instructions for both you the leader and the park ranger who will conduct your program. You are welcome to read the "on-site activities" if you would like to be familiar with what you will be doing during your time at Barataria, but please don't give away all of the fun secrets ☺ We recommend that you attempt to complete at least one pre-visit activity and one post-visit activity included in this document, but understand if you are unable to do so.

Finally, we'd love to hear about your pre-visit and post-visit experiences. Feel free to share photos that were taken during the field trip and of any post-visit artwork that your students create. You can contact your lead ranger for information on how to share your work with us.

What to expect during your program at the Barataria Preserve:

What you will see:

- 23,000 acre wetlands preserve located 16 miles from New Orleans on the west bank of the Mississippi River.
- 3 different types of wetlands habitats- of bottomland hardwood forests, swamps, and marshes
- A safe home for hundreds of plant and animal species.

Keep wildlife wild and safe by:

- Staying on the trails at all times
- No food on trails. We will eat lunch in a designated area.

What to bring:

- Everyone should wear closed toed shoes, like hiking boot or sneakers, and clothes that can get dirty
- Insect repellent and sunscreen
- A refillable water bottle.
- Your sense of fun and adventure!

The World Beneath Our Feet: Bugs and the Barataria Preserve

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Common Core Standards

Grade 1

Writing

CCSS.ELA-LITERACY.W.1.1
Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure.

CCSS.ELA-LITERACY.W.1.5
With guidance and support from adults, focus on a topic, respond to questions and suggestions from peers, and add details to strengthen writing as needed.

CCSS.ELA-LITERACY.W.1.6
With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.

Research to Build and Present Knowledge:
CCSS.ELA-LITERACY.W.1.7
Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions).

CCSS.ELA-LITERACY.W.1.8
With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

Speaking and Listening

CCSS.ELA-LITERACY.SL.1.1
Participate in collaborative conversations with diverse partners about *grade 1 topics and texts* with peers and adults in small and larger groups.

CCSS.ELA-LITERACY.SL.1.1.A
Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion).

CCSS.ELA-LITERACY.SL.1.1.B
Build on others' talk in conversations by responding to the comments of others through multiple exchanges.

CCSS.ELA-LITERACY.SL.1.1.C
Ask questions to clear up any confusion about the topics and texts under discussion.

CCSS.ELA-LITERACY.SL.1.2
Ask and answer questions about key details in a text read aloud or information presented orally or through other media.

CCSS.ELA-LITERACY.SL.1.3
Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.

CCSS.ELA-LITERACY.SL.1.4
Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

CCSS.ELA-LITERACY.SL.1.5
Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

CCSS.ELA-LITERACY.SL.1.6
Produce complete sentences when appropriate to task and situation. (See grade 1 Language standards 1 and 3 here for specific expectations.)

Reading: Literature

CCSS.ELA-LITERACY.RL.1.1
Ask and answer questions about key details in a text.

CCSS.ELA-LITERACY.RL.1.3
Describe characters, settings, and major events in a story, using key details.

CCSS.ELA-LITERACY.RL.1.7
Use illustrations and details in a story to describe its characters, setting, or events.

Grade 2, Common Core Standards

Writing

CCSS.ELA-LITERACY.W.2.6
With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.

Research to Build and Present Knowledge:
CCSS.ELA-LITERACY.W.2.7
Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

CCSS.ELA-LITERACY.W.2.8
Recall information from experiences or gather information from provided sources to answer a question.

Speaking and Listening

CCSS.ELA-LITERACY.SL.2.1
Participate in collaborative conversations with diverse partners about *grade 2 topics and texts* with peers and adults in small and larger groups.

CCSS.ELA-LITERACY.SL.2.1.A
Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).

CCSS.ELA-LITERACY.SL.2.1.B
Build on others' talk in conversations by linking their comments to the remarks of others.

CCSS.ELA-LITERACY.SL.2.1.C
Ask for clarification and further explanation as needed about the topics and texts under discussion.

CCSS.ELA-LITERACY.SL.2.2
Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

CCSS.ELA-LITERACY.SL.2.3

Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.

CCSS.ELA-LITERACY.SL.2.4

Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences.

CCSS.ELA-LITERACY.SL.2.6

Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification. (See grade 2 Language standards 1 and 3 here for specific expectations.)

Reading Literature

CCSS.ELA-LITERACY.RL.2.1

Ask and answer such questions as *who, what, where, when, why,* and *how* to demonstrate understanding of key details in a text.

CCSS.ELA-LITERACY.RL.2.3

Describe how characters in a story respond to major events and challenges.

CCSS.ELA-LITERACY.RL.2.7

Use information gained from the illustrations and words in a print or digital text to demonstrate understanding of its characters, setting, or plot.

Grade 3, Common Core Standards

Writing

CCSS.ELA-LITERACY.W.3.2
Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-LITERACY.W.3.2.A
Introduce a topic and group related information together; include illustrations when useful to aiding comprehension.

CCSS.ELA-LITERACY.W.3.7
Conduct short research projects that build knowledge about a topic.

CCSS.ELA-LITERACY.W.3.8
Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

Speaking and Listening

CCSS.ELA-LITERACY.SL.3.1
Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 3 topics and texts*, building on others' ideas and expressing their own clearly.

CCSS.ELA-LITERACY.SL.3.1.A
Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

CCSS.ELA-LITERACY.SL.3.1.B
Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).

CCSS.ELA-LITERACY.SL.3.1.C
Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.

CCSS.ELA-LITERACY.SL.3.1.D
Explain their own ideas and understanding in light of the discussion.

CCSS.ELA-LITERACY.SL.3.2
Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

CCSS.ELA-LITERACY.SL.3.3
Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

CCSS.ELA-LITERACY.SL.3.4
Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

CCSS.ELA-LITERACY.SL.3.5
Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details.

CCSS.ELA-LITERACY.SL.3.6
Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification. (See grade 3 Language standards 1 and 3 here for specific expectations.)

Reading Literature

CCSS.ELA-LITERACY.RL.3.1
Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

CCSS.ELA-LITERACY.RL.3.3
Describe characters in a story (e.g., their traits, motivations, or feelings) and explain how their actions contribute to the sequence of events

CCSS.ELA-LITERACY.RL.3.7
Explain how specific aspects of a text's illustrations contribute to what is conveyed by the words in a story (e.g., create mood, emphasize aspects of a character or setting)

Vocabulary List

Abdomen: one of the three main body segments of an insect and one of the two main body segments of an arachnid. The organism's organs, like the heart, reproductive organs, and digestive organs, are located in this body segment.

Adaptation: A trait or characteristic of an organism that helps it to survive in its habitat.

Arachnid: The class of arthropods that have 4 pairs of legs and two body segments. Spiders, ticks, scorpions, and mites belong to this class.

Arthropod: The phylum of animals characterized as invertebrates and have joined appendages. Arachnids, insects, crustaceans, centipedes, and millipedes belong to this group.

Beneficial insect or arachnids: Insects that help humans in some way, such as bees pollinating food crops or spiders that eat pest animals like cock roaches or mosquitoes.

Camouflage: The ability of an animal to blend into its surroundings making it difficult to be seen.

Cephalothorax: One of the two body segments of an arachnid. The cephalothorax is the fused head and thorax. The legs, eyes, and mouth parts are located on this segment.

Colony: A group of the same kind of insects that live together and cooperate to defend the colony, raise young, and gather food.

Complete metamorphosis: Insects that go through four stages of metamorphosis- egg, nymph, pupa, and adult.

Decomposer: An organism that breaks down dead or decaying material and helps carry out the process of decomposition.

Habitat: The natural home for a plant or animal.

Insect: The class of arthropods that have 3 body segments, 2 antennae and 3 pairs of legs. Some insects have wings, but not all. This group includes butterflies, beetles, grasshoppers, and dragonflies.

Incomplete metamorphosis: Insects that only go through three stages of metamorphosis- egg, nymph, and adult.

Invertebrate: An organism with no back bone.

Macro-Invertebrate: A small organism with no back bone that can be seen with the naked eye.

Poison: A substance that can cause an animal to become sick, or even die, if it is swallowed or if the animal touches it. Poison ivy contains an oil that causes an itchy, burning rash on a human when he or she touches it. Likewise, an animal that eat a Poison Dart Frog from the Amazon rain forest may become sick and die.

Pollination: The act of an insect or other pollinator transferring pollen to the reproductive organs of a plant and enabling fertilization.

Pollinator: An insect or other organism that pollinates a plant. Bees, butterflies, beetles, some ants, and some wasps are pollinators.

Solitary: An insect or arachnid that does not live in a hive, but rather lives and hunts on its own.

Terrestrial: An organism that lives on land.

Thorax: The middle segment of an insect. The legs and, if present, the wings are attached to this segment.

Venom: A substance that is injected into an animal via a stinger or fangs and causes the animal to become sick, or even die. Spiders use venom from their fangs to paralyze their prey.

Vertebrate: An organism with a backbone.

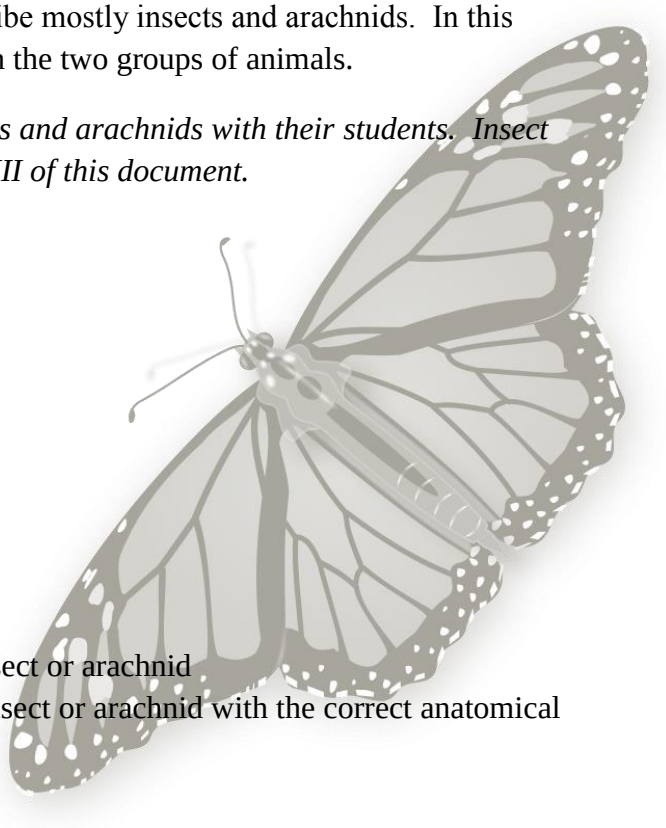
Pre-Visit Activity 1: Build a Bug

Grades 1 through 3 **Course: Science**

Introduction:

What is a bug? "Bugs" are a general term to describe mostly insects and arachnids. In this activity, students will learn the differences between the two groups of animals.

Prior to this activity, teachers should review insects and arachnids with their students. Insect and arachnid diagrams can be found in Appendix III of this document.



Materials:

- Drawing paper, 2 pieces per student
- Pencils
- Crayons or markers
- Clear tape or glue

Learning Goals and Objects:

During this activity, students will:

1. Use their imaginations to draw either an insect or arachnid
2. Deconstruct their drawing and rebuild an insect or arachnid with the correct anatomical parts

After this activity, students will:

1. Understand the anatomical difference between insects and arachnids
2. Be able to identify the body parts of insects and arachnids.

Directions:

1. Pass out materials to each student or a pair of students.
2. Instruct students to imagine an insect and draw its body parts of their paper. The body parts can be drawn together or separate, but the images should be large enough to be identifiable once they are cut out. Remind students that insects have 3 body segments, 6 legs, and 2 antennae; some insects also have wings.
3. Once everyone is mostly finished their drawing and coloring, instruct the students to cut out each of the body parts and place them in piles (legs, thorax, abdomen, etc).
4. Students will now trade insect body parts with each other until they have enough parts to re-build a bug.
5. Once students have all of their insect body parts, have them re-assemble and tape their new insect on Build a Bug worksheet found in **Appendix III.**

Pre-Visit Activity 2: Now You See Me, Now You Don't

Grades 1 through 3 **Course: Science**

Introduction:

Camouflage is the ability for an organism to blend in with its surroundings to make it more difficult for predators or prey to see it. This key ***adaption*** is common in many organisms, from spiders and beetles, to frogs and snakes, to deer and birds. ***Macro-invertebrates***, small animals with no backbone, such as insects and spiders, are both predators and prey to a variety of animals. Because these organisms occupy such a tenuous place on the food chain, they must be able to hide from others in order to keep from being eaten or to sneak up and catch their prey.

There are several types of camouflage tactics that animals can use. Full descriptions of the different forms of camouflage can be found on the National Geographic Education Encyclopedia page: http://education.nationalgeographic.com/education/encyclopedia/camouflage/?ar_a=1.

Focus:

Students will work together to make an insect or arachnid out of play-dough. The students will have to choose play-dough colors that will camouflage or match the colors in a piece of scrapbook or patterned paper.

Learning Goals:

During this activity, students will:

1. Work in small groups to create an anatomically correct insect or arachnid
2. Work together to choose which colors to use to build their bug that would best camouflage to the paper given

At the end of this activity, students will:

1. Be able to describe what camouflage is.
2. Be able to discuss how and why camouflage is an important adaptation for insects and arachnids

Materials:

- Several sheets of scrapbook paper or other colorfully patterned paper, 1 sheet per group
- Play-dough, multiple colors to match the different patterned paper
- Small trays or plates

Activity Instructions:

1. Prior to activity, the instructor should choose 3 to 5 colors of play-dough for each piece of scrapbook paper. At least 1 of the colors of play-dough should not match the colors in the scrapbook paper. To avoid waste, use a small amount of each color play-dough for each team of students.
2. Review the concepts of camouflage and predator-prey relationships with the students.
3. Have one or two volunteers pass out the supplies to each group of students. Be sure not to mix up the trays and their corresponding papers.
4. Instruct the students that they are to build an insect or arachnid out of the play-dough. The students can create whatever type of bug they wish, but the organism must have the correct body parts and must camouflage to the paper.
5. Check comprehension by visiting each group and asking the students what they are building- an insect or arachnid. Ask them how they know it's an insect versus an arachnid. Answers should include "insects have 6 legs, 3 body segments, and 2 antennae," or "my spider has 4 pairs of legs and two body parts." Also, ask the students why they chose the colors they used and how that will help the bug hide from predators or prey.

Discussion questions:

- How does an insect's adaptation of camouflage help it survive in its habitat?
- How do insects and arachnids hide from their predators or their prey? Why is hiding important?
- Why might insects rely on background matching more so than any other forms of camouflage?
- Can you think of any insect that might use warning coloration or another form of camouflage?
- How can knowing about insects and arachnids' ability to hide in plain sight help you in your daily life?

*NOTE: to prolong the life of the play-dough, stress that the students are not allowed to mix the colors together.

Pre-Visit Activity 3: *Eliza and the Dragonfly*

Grades 1 through 3 **Course: English & Language Arts and Science**

Introduction:

Bugs are all around us! Some bugs are quite beautiful and fill us with wonder, whereas others seem so alien and can scare us. Join Eliza and her Aunt Doris as they discovery and learn about the hidden world of aquatic invertebrates. Horace the Dragonfly Nymph will show your students that even the most alien-looking creatures are beautiful and can help people.

Materials:

- A copy of the book *Eliza and the Dragonfly* by Susie Caldwell Rinehart obtained from a library or bookstore.
- Student worksheets found in Appendix II

Learning Objectives and Goals:

During this activity, students will:

1. Read aloud or to themselves all or portions of the book *Eliza and the Dragonfly*.
2. Discuss their feelings and thoughts about the world of bugs around them.
3. Identify the roles the insects in the book play in the story.
4. Discuss the roles of bugs in their own lives.

At the end of the activity, students will:

1. Be able to recognize that some animals completely change their bodies as they mature (metamorphosis)
2. Be able to discuss at least 2 ways insects and arachnids help humans.
3. Journal or create a piece of art representing their feelings about bugs based on their readings.

Activity Instructions:

1. Assign students the book *Eliza and the Dragonfly* to read as either a homework or in-class assignment.
2. Have each student complete the *Eliza and the Dragonfly* Student Worksheet found in Appendix II.
3. After you field trip to the Barataria Preserve, complete the post-visit journaling activity.

Field Trip Activity 1: Terrestrial Insect Sampling

Grades 1 through 7 **Course: Science**

Introduction:

Look up! Look down! Look all around! Invertebrates can be found all around you. Some fly in the air, some crawl on the ground, and some burrow under the soil. Because invertebrates are small and can hide almost anywhere, scientists use many different methods to collect invertebrates.

Focus:

Students will join a park ranger and learn how to safely collect insects for observation from their natural habitat.

Learning Goals:

Upon completing the ranger-guided activity, students will:

1. Know how to safely collect macro invertebrates.
2. Know which collection method to choose for a particular type invertebrate.
3. Be able to describe where and why certain types of invertebrates might be found in a particular habitat.

Materials: Provided by the Park Ranger

- Aerial and sweep nets
- Sorting trays
- Collecting jars and bug boxes
- Hand lenses

Activity Instructions:

After a safety talk and introduction to the Barataria Preserve, the Ranger will lead the students in an invertebrate collecting activity. Students will first spend 5 minutes recording their observations about their collection site and draw a picture of what the habitat looks like. Then, students will be provided with collection materials: nets, collection containers, sorting trays, and hand lenses- and be given tutorials on how to properly and safely collect organisms.

Please note that full participation is mandatory for all teachers and chaperons during this activity. Teachers- please inform your chaperons of the nature of the field trip. All participants should be prepared to go off-trail in the woods where they will encounter bugs and other wildlife.

Collection technique descriptions:

- ***Aerial nets***: Aerial nets are thin, light-colored nets used to catch delicate, flying insects like butterflies, dragonflies, and moths. Students will gently wave nets over the tops of flowers and other plants to capture flying insects.
- ***Sweep nets:*** Sweep nets are larger nets with heavier fabric than aerial nets. Students will sweep these nets back and forth through bushes, trees, and other vegetation to scoop up any invertebrates.
- ***Log Busting:*** Students will choose a small, decomposing log no larger than their forearm to break apart on a sorting tray. They will use forceps and magnifying glasses to sort through the decaying log and pick out any invertebrate and place it in a collection jar.
- ***Leaf litter sorting:*** Students will carefully gather a pile of leaves from the forest floor onto a tray. They will use forceps and magnifying glasses to sort through the leaves and pick out any invertebrate and place it in a collection jar.

After about 30 minutes of collecting, the students will return to the Education Center to observe, identify, and record their samples.

Please note:

All education programs at the Barataria Preserve practice capture-and-release techniques. After the students have spent time identifying their organisms, they will release their samples back into the woods. No one will be permitted to take samples home.

Field Trip Activity 2: Identifying and Recording Collection Samples

Grades 1 through 3 **Course: Science**

Focus:

Continuing from the hands-on bug hunt, students will work in small groups to identify the organisms they have collected. Students will learn use field guides and identification charts to identify the invertebrates collected from the previous activity. Working in groups, the students will then record their data on provided charts and work with the ranger to analyze and discuss the data.

Learning Objectives and Goals:

During this activity, student will:

1. Use field guides or identification charts to identify unknown organisms to the family or species level.
2. Record, analyze, and make inferences about the data collected from the collection activity.

Upon completing this activity, student will be able to:

1. Identify down to the family level at least 3 of the orgasms they collected during the bug hunt.
2. Describe the differences between insects, arachnids, and other invertebrate species.
3. Organize their collection according to taxonomic groupings.

Materials- Provided by the Park Ranger

- Grade-appropriate field guides and identification charts
- Pencils
- Data chart

Activity Instructions:

- After collecting their invertebrates, the students will join the park ranger in the Education Center classroom to begin identifying their organisms.
- Students will use provided field guides and identification resources to identify the organisms they have captured.
- The park ranger will provide the students will data charts and pencils. As the students identify their organisms, they will record the names and number of specimens on the data chart.

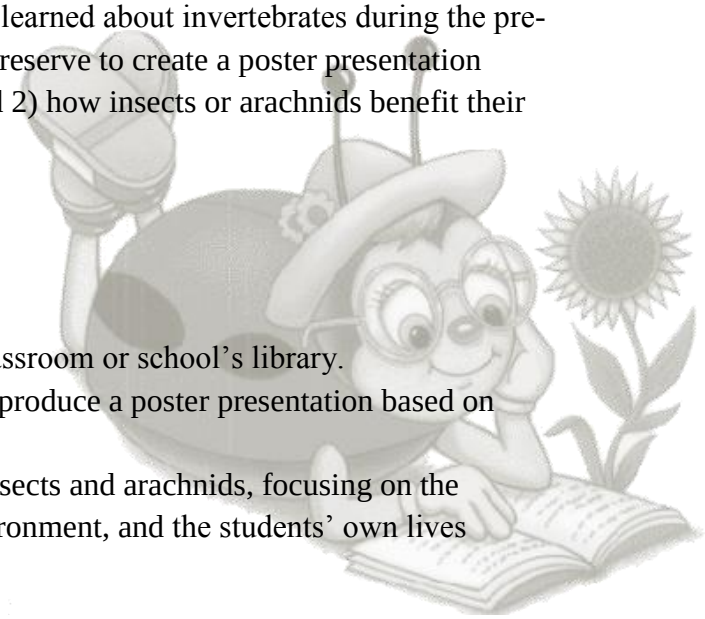
- Once all of the students are finished identifying their organisms, the ranger will work with the group to create a larger class chart to total all specimens. The ranger will lead a discussion about the findings.

Post-visit Activity: What's Bugging You?

Grades 1 through 3 **Course: Science**

Focus:

Students will combine the information they've learned about invertebrates during the pre-visit activities with their experiences at the Barataria Preserve to create a poster presentation about 1) the role invertebrates play in the wetlands and 2) how insects or arachnids benefit their own lives.



Learning Objectives and Goals:

During this activity, students:

1. Will conduct research using books from the classroom or school's library.
2. Will work independently or in small groups to produce a poster presentation based on their research topic
3. Will reflect on their feelings and ideas about insects and arachnids, focusing on the relationship between, the organisms, their environment, and the students' own lives

After completing this activity, student will:

1. Be able to identify and discuss the roles invertebrates play in wetlands ecosystems
2. Be able to identify ways in which they can help invertebrates survive in their habitats.

Materials:

- Poster paper or drawing paper
- Pencils
- Crayons, markers, color pencils
- Research materials

Activity Instructions:

- Students will look through books about insects, arachnids, and other invertebrates and choose one to create a poster about it.
- Each student's poster should include the following:
    - A drawing of the animal
    - The animal's name at the top of the poster
    - A drawing of the animal's habitat, including its food, water, shelter, and space
    - A list of 2 ways the animal helps humans, e.g. bees pollinate flowers, spiders eat harmful insects, earth worms help create new soil.

- After everyone completes their posters, they will share them with the class. During his or her presentation, each student should name at least one way he or she help the animal to survive.

Suggested list of invertebrates that can be found in south Louisiana's wetlands:

Insects	Bumble bee	Long-Jawed Orbweaver
Giant Swallowtail Butterfly	Carpenter Bee	Spiny Crab-like Orbweaver spider
Luna Moth	Blue Dasher dragonfly	Thin-legged Wolf spiders
Io Moth	Carolina Mantid	Six-spotted Fishing spider
Eyed Click Beetle	Crane Fly	Common House Spider
Patient Leather Beetle	Formosan Subterranean Termite	Spotted Orbweaver
Asian Tiger Mosquito	True Katydid	Daddy Longlegs
Eastern Pondhawk Dragonfly	Salvinia weevil	Black-legged Tick
Ebony Jewelwing Damselfly	Oak Hairstreak Butterfly	Lone Star Tick
Love Bug	Blue Mud Dauber	Chigger
Carpenter Ant	Red paper wasp	**Other invertebrates**
Deerfly	**Arachnids**	Earth worm
Black Horse Fly	Golden Silk Orbweaver spider	Garden Centipede
Giant Water Bug	Garden Orbweaver Spider	Soil Centipede
Eastern Lubber Grasshopper	Harvestmen spider	Spirobolid millipede
Tent Moth	Brown Recluse spider	Land snails
Isabella Tiger Moth	Orchard Orbweaver spider	Land slugs

Appendix I:

Field Trip Materials

Name: _____

Directions: With your partner, use the space below to record your ***observations*** about your surroundings. Then, draw a picture on the back of this paper of the habitat around you.

What do you see? Do you see any animals? What do the plants look like? Do you see any water, sticks, or other places where bugs can hide?
What do you hear? Describe the sounds and guess what you think they are.
What do you smell? Describe the smells and guess what you think they are.
How do you feel? Excited? Nervous? Scared? Why do you feel this way?

Use the space below to draw a picture of your surroundings.

Name: _____

Directions: With your partner, use field guides to determine what kind of macro-invertebrates you caught during the bug hunt. Record your findings on the chart below and answer the questions when you are finished.

Order	Family	Number Caught- Use tally marks	Total Number
Coleoptera	Beetles		
Dermaptera	Earwigs		
Diptera	Flies, Love Bugs		
Hemiptera	True Bugs		
Homoptera	Cicadas		
Hymenoptera	Bees, wasps, ants		
Lepidotera	Butterflies, moths		
Odonata	Dragonflies, damselflies		
Orthoptera	Grasshoppers, crickets, katydids		
Phasmida	Walking sticks		
Araneae	Spiders		
Opiliones	Daddy-long-legs		
Spriobolida	Millipedes		
Opisthopora	Earthworms		
Stylommatophora	Snails and Slugs		
Isopoda	Pill bugs		

How many total *insects* did you catch? _____

How many total *arachnids* did you catch? _____

How many other invertebrates did you catch? _____

Which capture method got the most invertebrates? Circle one:

Aerial nets Sweep Net Log Busting Leaf-litter sorting

Appendix II:

Eliza and the Dragonfly Activities

Name: _____ Date: _____

***Eliza and the Dragonfly* Student Worksheet**

Directions: Read the story *Eliza and the Dragonfly* and complete the activities below.

1. Aunt Doris loves bugs; she thinks they are "magnificent." Do you like bugs? How do you feel about bugs like dragonflies, spiders, crickets, or ants? Write 3 sentences describing what you feel about bugs.

_____

_____

_____

_____

_____

_____

_____

2. Horace the dragonfly lives in a pond and has everything he needs to survive: food, water, shelter, and space. He is a predator with large hooks to catch his food. What do you think Horace eats?

_____

3. Use the space below to draw and label a 4-element food chain that might be found in Horace's pond. Remember to include a producer, some consumers, and a top predator. Horace the Dragonfly needs to be in the food chain, too!

Eliza and the Dragonfly Student Worksheet

4. Horace changes from a bug that swims in the water to a bug that flies through the air. This change is called metamorphosis. Imagine that you have gone through metamorphosis and are flying over a pond that you used to swim in.

   Draw a picture of what you see as you fly over your old pond:

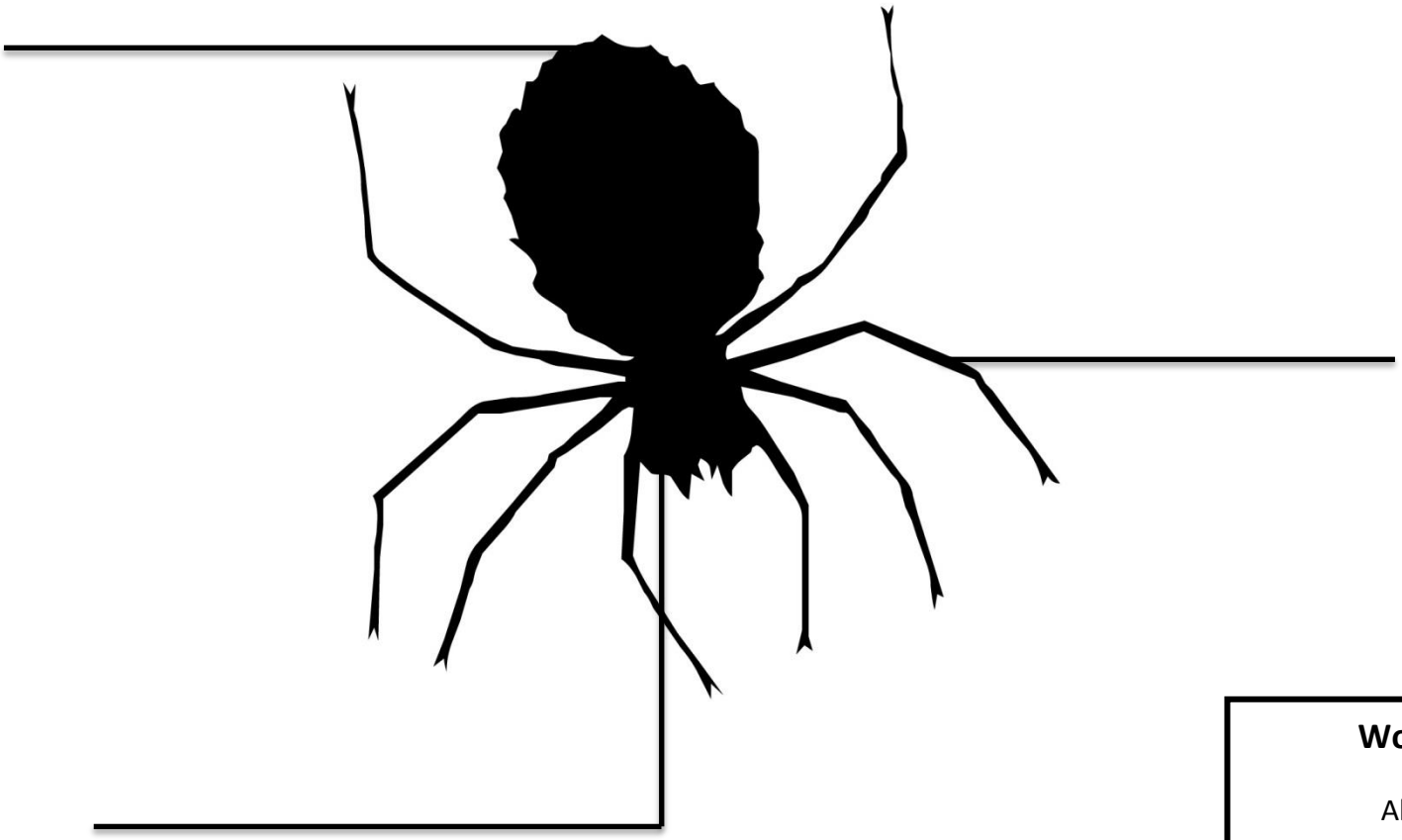
5. All bugs have an important job to do in their ecosystems. Brainstorm 3 different bugs that help humans and write down the ways they help us.

	Type of Bug	**How it helps me**
Example	***Spider***	***Eats harmful insects like mosquitoes.***
1.		
2.		
3.		

Appendix III:

Classroom Activities

Label the Arachnid



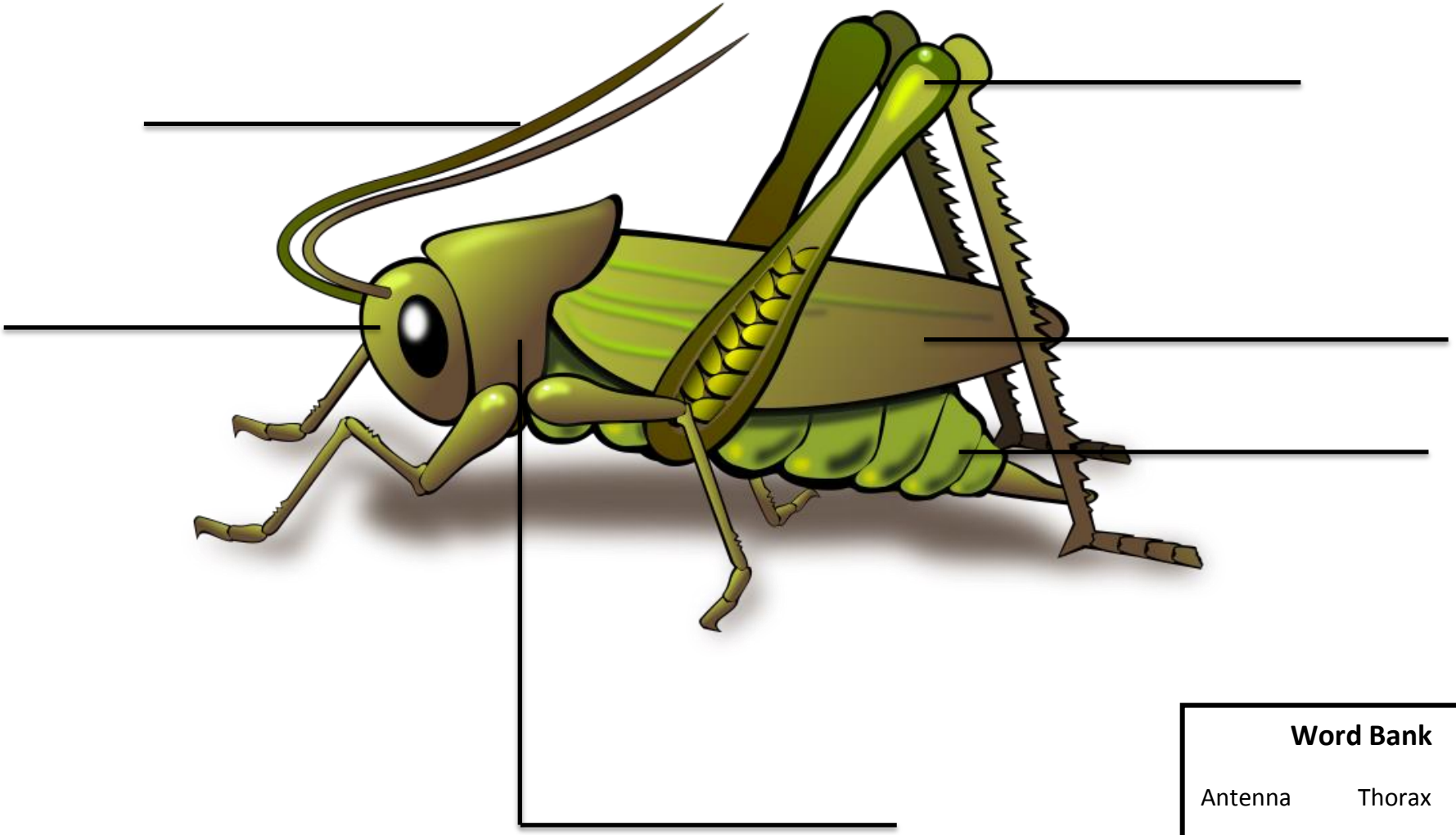
Word Bank

Abdomen

Legs

Cephalothorax

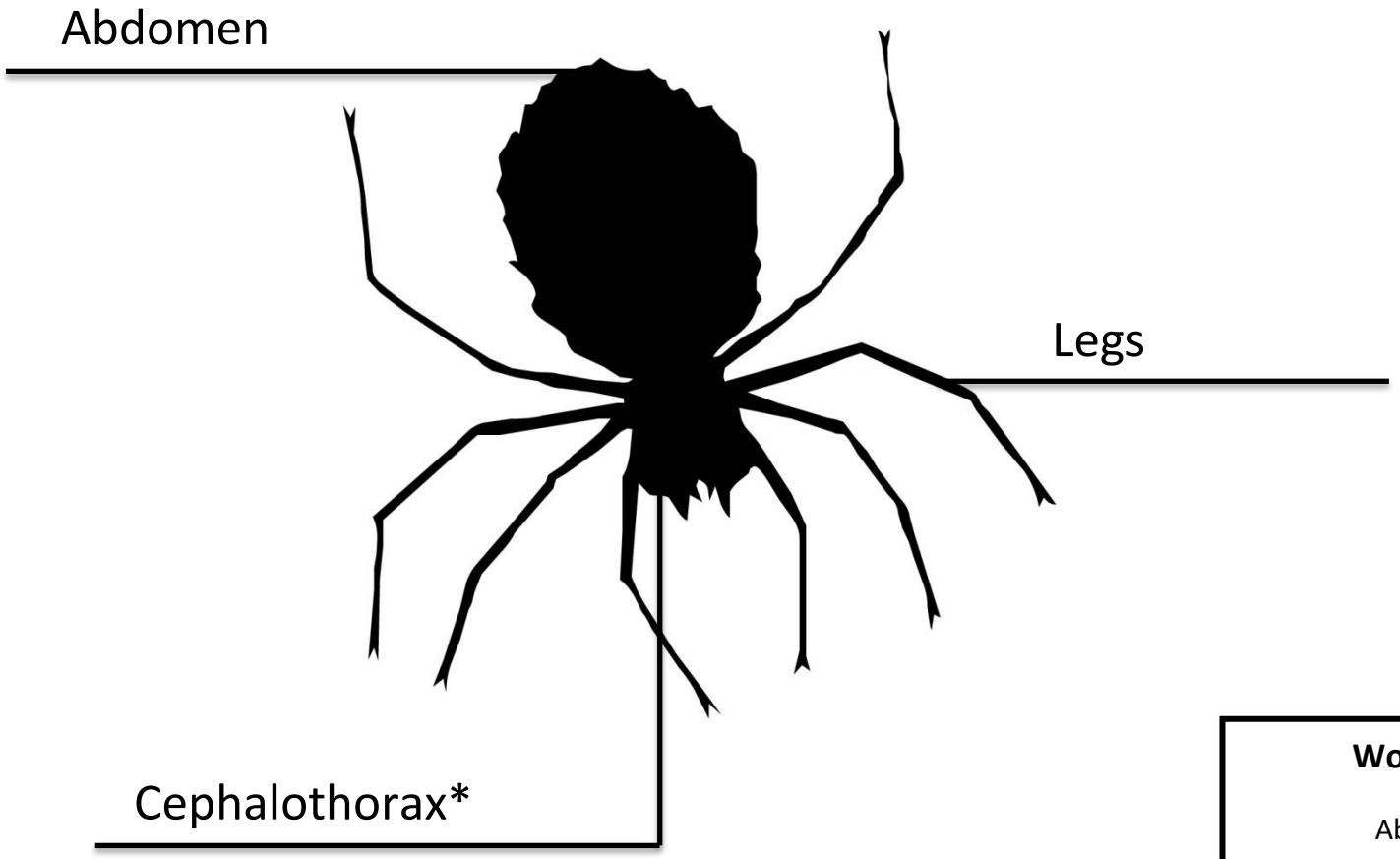
Label The Insect



Word Bank

Antenna	Thorax
Wings	Abdomen
Legs	Head

Label the Arachnid- Teacher's Key



Word Bank

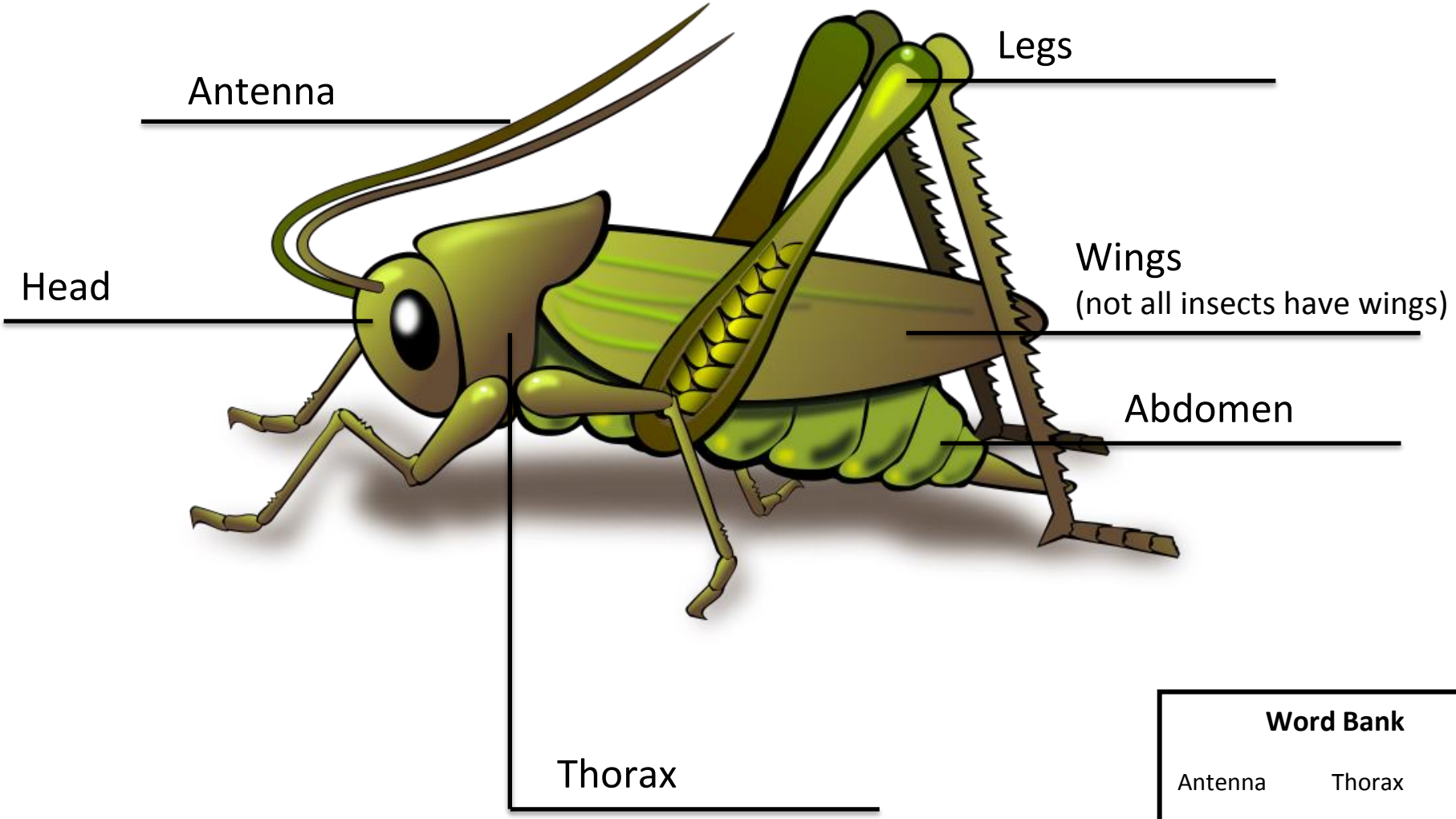
Abdomen

Legs

Cephalothorax

* Note: the "cephalothorax" is the head and thorax fused into one body segment.

Label The Insect- Teacher's Key



Word Bank

Antenna	Thorax
Wings	Abdomen
Legs	Head

Name: _____ Date: _____

Build a Bug!

Directions: Put your bug back together! Arrange your pile of bug body parts on the paper below to form a new insect or arachnid. Be sure you place each body part in its correct spot. Label each body part and answer the questions at the bottom of the page.

Insect Body Parts Word Bank:

Head

Thorax

Abdomen

Leg

Antenna

Wing

Arachnid Body Parts Word Bank:

Cephalothorax

Abdomen

Legs

My Bug's Name: _____

My Bug Lives: _____

My Bug Eats: _____

Name: _____ Date: _____

It's a Bug's World Word Search

Directions: Search for the words below. Hint: The words go up-and-down, side-to-side, and diagonal, but not backwards.

Word bank

Abdomen	Adaptation	Arachnid	Arthropod
Camouflage	Cephalothorax	Colony	Decomposer
Habitat	Insect	Invertebrate	Metamorphosis
Poison	Pollination	Solitary	Terrestrial
Thorax	Venom	Vertebrate	

J	C	A	R	A	C	H	N	I	D	V	P	M	O	F	Y	X
D	A	Y	I	Z	I	S	F	J	H	N	O	B	N	S	N	X
X	M	X	N	W	N	J	E	F	Z	G	I	D	H	O	O	M
C	O	J	V	V	E	G	Y	O	M	T	S	R	A	L	Y	E
M	U	I	E	E	C	H	A	I	R	E	O	D	R	I	T	T
D	F	N	R	N	Z	F	D	V	P	R	N	J	T	T	H	A
E	L	S	T	O	M	G	A	E	O	R	P	P	H	A	O	M
C	A	E	E	M	H	K	P	R	L	E	H	K	R	R	R	O
O	G	C	B	B	A	F	T	T	L	S	U	P	O	Y	A	R
M	E	T	R	H	B	Y	A	E	I	T	W	Z	P	S	X	P
P	Q	B	A	Z	I	F	T	B	N	R	M	F	O	J	Y	H
O	G	I	T	M	T	H	I	R	A	I	H	U	D	N	V	O
S	G	C	E	V	A	R	O	A	T	A	C	H	O	S	A	S
E	X	O	L	E	T	O	N	T	I	L	A	L	F	R	B	I
R	L	O	Q	K	P	I	X	E	O	K	O	U	U	L	A	S
Q	I	A	B	D	O	M	E	N	N	C	V	D	H	C	G	G
P	V	D	C	E	P	H	A	L	O	T	H	O	R	A	X	U

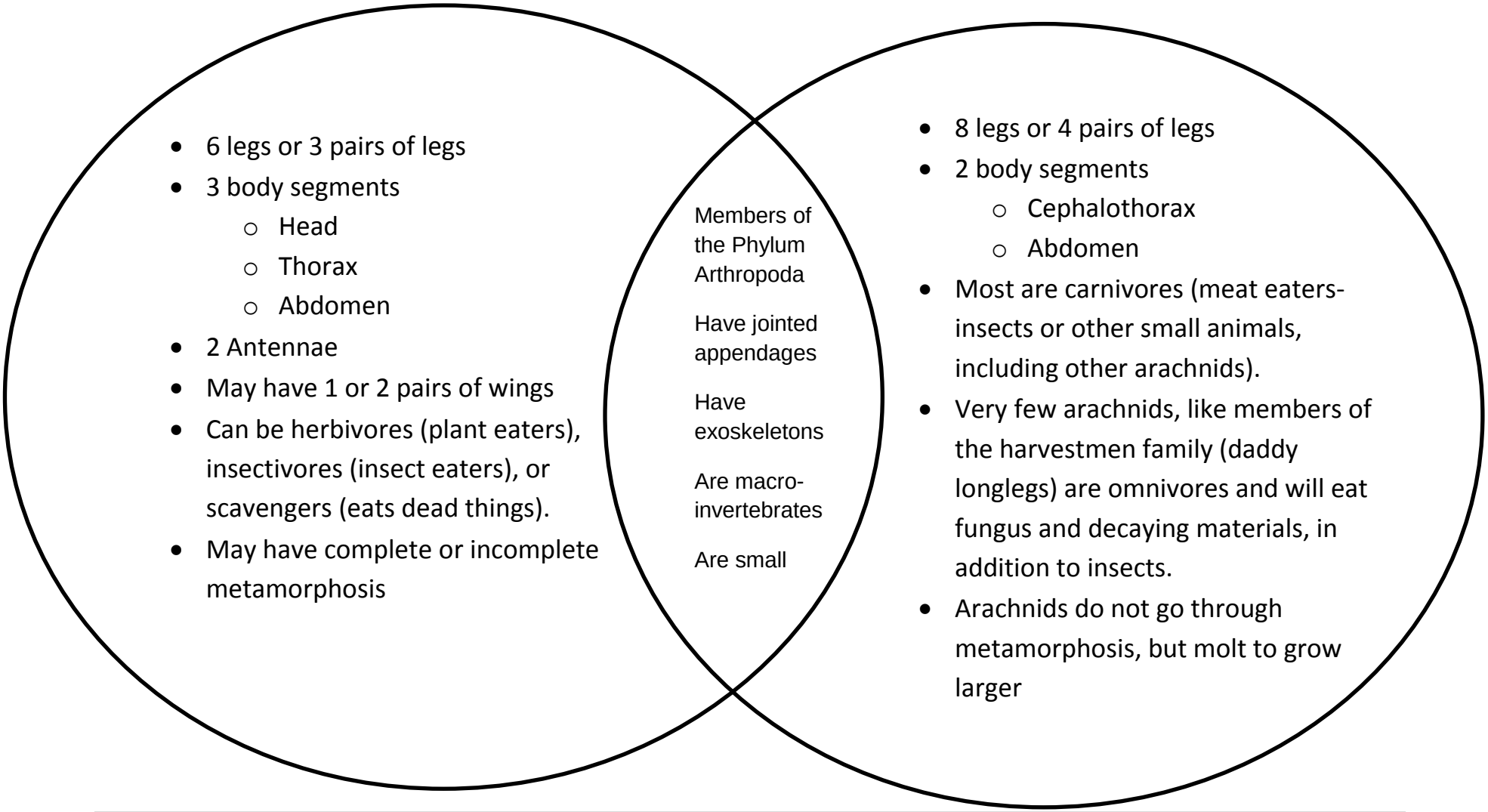
It's a Bug's World Word Search

Answer Key

J C A R A C H N I D V P M O F Y X
D A Y I Z I S F J H N O B N S N X
X M X N W N J E F Z G I D H O O M
C O J V V E G Y O M T S R A L Y E
M U I E E C H A I R E O D R I T T
D F N R N Z F D V P R N J T T H A
E L S T O M G A E O R P P H A O M
C A E E M H K P R L E H K R R R O
O G C B B A F T T L S U P O Y A R
M E T R H B Y A E I T W Z P S X P
P Q B A Z I F T B N R M F O J Y H
O G I T M T H I R A I H U D N V O
S G C E V A R O A T A C H O S A S
E X O L E T O N T I L A L F R B I
R L O Q K P I X E O K O U U L A S
Q I A B D O M E N N C V D H C G G
P V D C E P H A L O T H O R A X U

Insect and Arachnid Venn Diagram

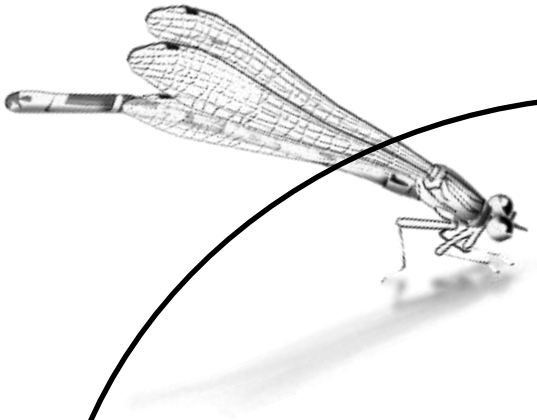
Answer key

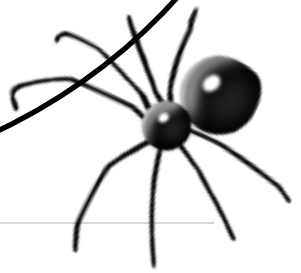


Name: _____ Date: _____

Insect and Arachnid

Venn Diagram





Insect

Arachnid